Decks Surfaces

- Decking, surfaces, stair treads, risers and landings of decks, porches and balconies where any portion of such surface is within 10 feet (~3000 mm) of *primary* building (in this case, usually a home) shall comply with *one* of the following:
  - constructed with ignition resistant material and pass performance requirements of SFM 12-7A-4, Parts A and B, **or**
    - Chapter 7A predominately addresses the deck surface (deck boards, rails, treads, etc), not the underlying structural support members. This performance-based method that relies on passing both parts of SFM 12-7A-4 (i.e., Parts A **and** B). The ignition resistant requirement is there to assure the product has successfully completed the accelerated weathering procedure.

  - constructed with heavy timber, exterior fire resistant treated wood, or approved noncombustible materials, **or**
    - This second method is to be of heavy timber construction (as specified in Section 605.6 in the CBC), exterior fire retardant treated wood (i.e., ignition resistant) or approved noncombustible. For decking and stair treads, 'heavy timber' means that deck boards are a minimum of 3-inches thick.

  - pass SFM 12-7A-4 Part A (only) with a net peak Heat Release Rate (HRR) of 25 kW/ft2 for a 40 minute observation period, **and** pass accelerated weathering test and be identified as 'exterior' type (UBC 23-4).
    - If deck is <10 feet (~3000 mm) from the wall, wall shall be constructed of approved noncombustible or ignition resistant material. (*Exception:* Walls are not required to comply with this subsection if decking flame spread is rated Class B when tested to ASTM E-84.)
    - For decking that complies with this option, the AHJ should specifically look for results of the flame spread testing following an ASTM E-84 procedure. Class B means a flame spread of 75 or less**.**
    - The third way to comply is to pass the under deck portion of SFM 12-7A-4 (meaning, Part A only) with a heat release rate not to exceed 25 kW (for the nominal area of the deck used in the test). To comply using this method, the decking must also be rated as exterior type (by passing the accelerated weather test outlined in UBC 34-4 [same as ASTM D-2898]. The weathering requirement applies to all decking products that comply under this section.
    - If the decking that complies via the Part A only path, and is within 10 ft of the exterior wall, the exterior wall itself must be approved noncombustible or meet requirements for an ignition resistant material. The exception says that if the decking has a Class B flame spread rating when tested to ASTM E-84, the 'within 10-ft of the exterior wall' requirement doesn't apply.
    - Untreated redwood heartwood has a Class B flame spread rating, and also has a HRR of less than 25 when tested to SFM 12-7A-4, Part A.\
    - For some plastic lumber composite materials, it is quite possible that they will be able to obtain the SFM required 25 kW / ft2 (269 kW / m2) HRR and a Class C rating when tested to ASTM E 84.

- If the flame spread is greater than 75 (a ‘Class C’ flame spread), the exterior siding will have to be constructed of an approved noncombustible or ignition resistant material.

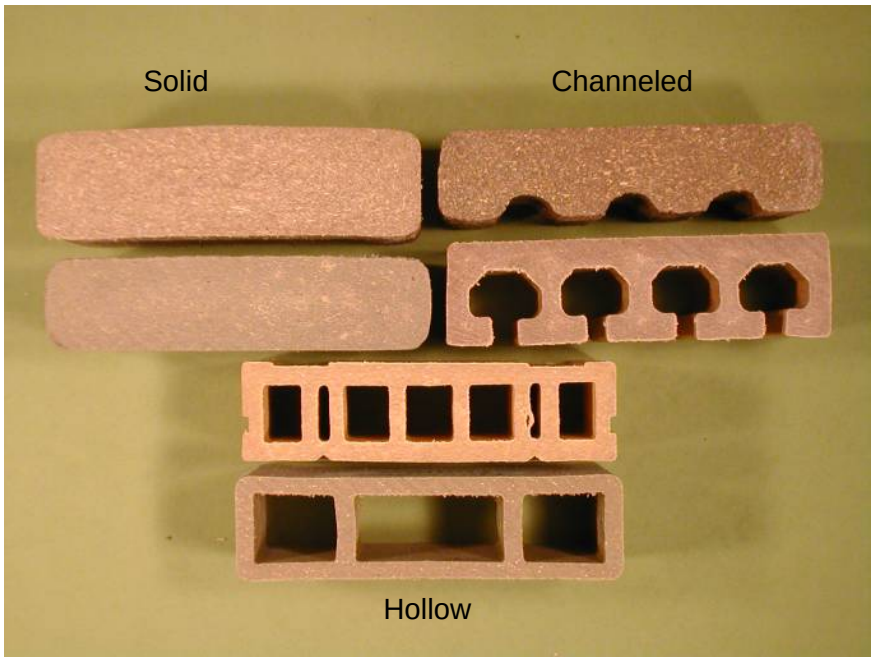
- ***Exception:*** **Walls are not required to comply with this subsection if decking flame spread is rated Class B when tested to ASTM E-84.**

Decking (Solid Wood, Plastic, or Fiber-Plastic)

- Composite decking products differ in the type and amount of plastic and fiber. The fire performance of a given product will depend on the type of plastic used, whether or not fiber is included, and the additives incorporated into the process.
- Additives are incorporated into the material mix to improve properties and performance, and improve the manufacturing process.
  - Coupling agents (improve strength and durability properties). Expensive, so not excessive commercial use.
  - Lubricants (increase production, improve surface characteristics)
  - Specialized
    - Biocides
    - Pigments
    - others

    Source: Washington State University, Wood Materials and Engineering Laboratory, Pullman, WA

- These are examples of various types of wood plastic composite (WPCs) materials.



- Fire performance depends on the following factors:
  - type of plastic
  - fiber type / content
  - shape (solid, hollow, channeled)

Performance of decking

- In a wildfire decks are vulnerable from a surface fire from below and/or ember attack from above. If ignited, the deck can result in a longer term flame impingement exposure, potentially igniting or otherwise resulting in failure of the siding, and/or breaking the glass of a window or sliding glass door. Chapter 7A only addresses the decking materials, and not the underlying structural support system.
- Deck issues
  - Open frame (spaced deck board) versus solid surface, membrane deck
  - Most deck boards used in open framed decks are considered combustible (wood, plastic or fiber-plastic composites).
  - If exterior rated fire-retardant treated, deck boards can be classified as ignition resistant.
  - Most solid surface deck surfaces are non-combustible (concrete, stone, tile, etc.)
- Flame spread, edge of deck to wall
  - Horizontal or vertical enclosure is not required for decks to comply with the provisions of Chapter 7A. If decks are enclosed, either vertically (to grade) or horizontally (under deck), related moisture accumulation issues should be accounted for, either with venting or other deck drainage / drying out design provisions.
- Tests
  - Tests conducted at the UCFPL Fire Research Laboratory indicated that boards with channeled construction didn't perform as well when subjected to an under deck flame impingement exposure. Boards with a hollow construction didn't perform as well when exposed to the ('A') brand (on top of deck) test. Engineering and formulation changes that many manufacturers are doing to comply with SFM 12-7A-4 may change this general rule.
  - Result in loss of building if heat released while burning is large enough to ignite siding, or break glass in windows or sliding glass doors. Flame spread across deck can also result in building loss in a similar way.

Increasing HRR (this is much greater than 25 kW / ft^2)

Dropping flaming debris

(These are pictures taken during testing of decking products during the development of the testing protocol that resulted in SFM 12-7A-4.)

  - Conditions of acceptance for the deck tests, as stated in 12-7A-4 Part A (12-7A-4.7.5). Under deck test
    - Peak heat release rate of less than or equal to 25 kW/ft2.
      1) Absence of sustained flaming or glowing combustion of any kind at the conclusion of the 40-minute observation period.

2) Absence f structural failure of any deck board.
3) Absence of falling particles that are still burning when reaching the burner for floor.

- Part B (12-7A-4.8.5). Burning Brand Exposure
  - Absence of sustained flaming or glowing combustion of any kind at the conclusion of the 40-minute observation period.
  - Absence of structural failure of any deck board.
  - Absence of falling particles that are still burning when reaching the burner of floor.